

Claims

[c1] A method for producing a lightweight starting stock for gun frames and gun components comprising:
mixing alloying elements into aluminum to provide a density of <0.106 pounds per cubic inch,
casting a billet,
optionally, extruding said billet into starting stock,
forging the billet or starting stock into a gun frame or gun component wherein secondary machining may be performed to achieve final dimensions, or alternatively, machining the starting stock into a gun frame or gun component,
solution heat treating said component
quenching said gun component and artificial aging said gun component
wherein said gun component has a yield strength of >90 ksi.

[c2] B The method of claim 1 wherein said gun frame or gun component has a yield strength of >80 ksi.

[c3] The method of claim 1 wherein said gun frame or gun component has a yield strength of >70 ksi.

[c4] C The method of claim 1 wherein the solution heat treatment, quench and artificial aging is performed to the billet or extruded starting stock, and said starting stock is then machined into a gun frame or gun component, wherein said gun component has a yield strength of >90 ksi.

[c5] The method of claim 1 wherein the solution heat treatment, quench and artificial aging is performed to the billet or extruded starting stock, and said starting stock is then machined into a gun frame or gun component, wherein said gun component has a yield strength of >80 ksi.

[c6] The method of claim 1 wherein the solution heat treatment, quench and artificial aging is performed to the billet or extruded starting stock, and said

starting stock is then machined into a gun frame or gun component, wherein said gun component has a yield strength of >70 ksi.

[c7] The method of claim 1 wherein the billet is fabricated via powder metallurgy or spray cast methods as opposed to conventional casting techniques.

[c8] A method for producing a lightweight starting stock for gun frames and gun components comprising:

mixing alloying elements into aluminum with the alloy composition containing 6.2 9.0 wt% Zn, 1.0 3.0 wt% Mg, 0 2.5 wt% Cu, and 0.02 to 0.50 wt% of at least one grain refining element selected from a group consisting of Zr, Sc, Cr, Mn, Ti and Hf, and casting said elements into a billet,

optionally, extruding said billet into starting stock, forging the billet or starting stock into a gun frame or gun component wherein secondary machining may be performed to achieve final dimensions, or alternatively, machining the starting stock into a gun frame or gun component, ,

solution heat treating/said component

quenching said gun component and

artificial aging said gun component

wherein said gun component has a yield strength of >90 ksi.

[c9] The method of claim 8 wherein said gun frame or gun component has a yield strength of >80 ksi.

[c10] The method of claim 8 wherein said gun frame or gun component has a yield strength of >70 ksi.

[c11] The method of claim 8 wherein the solution heat treatment, quench and artificial aging is performed to the billet or extruded starting stock, and said starting stock is then machined into a gun frame or gun component, wherein said gun component has a yield strength of >90 ksi.

[c12] The method of claim 8 wherein the solution heat treatment, quench and

artificial aging is performed to the billet or extruded starting stock, and said starting stock is then machined into a gun frame or gun component, wherein said gun component has a yield strength of >80 ksi.

[c13] The method of claim 8 wherein the solution heat treatment, quench and artificial aging is performed to the billet or extruded starting stock, and said starting stock is then machined into a gun frame or gun component, wherein said gun component has a yield strength of >70 ksi.

[c14] The method of claim 8 wherein the billet is fabricated via powder metallurgy or spray cast methods as opposed to conventional casting techniques.

[c15] A method for producing a lightweight starting stock for gun frames and gun components comprising:
mixing alloying elements into aluminum using the alloy families: Al-Zn-Mg-Cu, Al-Zn-Mg, Al-Cu-Li, Al-Si-Mg or Al-Cu-Mg
wherein said alloy families are cast into a billet
optionally, extruding said billet into starting stock,
forging the billet or starting stock into a gun frame or gun component
wherein secondary machining may be performed to achieve final dimensions, or alternatively, machining the starting stock into a gun frame or gun component, ,
solution heat treating said component
quenching said gun component and
artificial aging said gun component
wherein said gun component has a yield strength of >70 ksi.

[c16] The method of claim 15 wherein said gun frame or gun component has a yield strength of >80 ksi.

[c17] The method of claim 15 wherein said gun frame or gun component has a yield strength of >80 ksi.

[c18] The method of claim 15 wherein the solution heat treatment, quench

and artificial aging is performed to the billet or extruded starting stock, and said starting stock is then machined into a gun frame or gun component, wherein said gun component has a yield strength of >90 ksi.

[c19] The method of claim 15 wherein the solution heat treatment, quench and artificial aging is performed to the billet or extruded starting stock, and said starting stock is then machined into a gun frame or gun component, wherein said gun component has a yield strength of >80 ksi.

[c20] The method of claim 15 wherein the solution heat treatment, quench and artificial aging is performed to the billet or extruded starting stock, and said starting stock is then machined into a gun frame or gun component, wherein said gun component has a yield strength of >70 ksi.

[c21] The method of claim 15 wherein the billet is fabricated via powder metallurgy or spray cast methods as opposed to conventional casting techniques.